

Work Order ID 75644

75644

Page 1

October-27-11 11:43:08 AM

Item ID: D6006-129 Accept ***N900040100*** Setup Start ***NS1***
 Revision ID: ***20*** Stop ***NS2***
 Item Name: Crosstube Material
 Start Date: 27/10/2011 Start Qty: 20.00
 Required Date: 29/11/2013 Req'd Qty: 20.00
 Reference: Cust Item ID:
 Customer:

Approvals: Process Plan: M.L.J Date: 11/10/27 Tooling: _____ Date: _____
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____
 Run Start ***NR1***
 Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D6006	Rev A								
100	PURCHASING	0.00							
100									
Purchasing	Memo	0.00							
Purchasing	Issue P/O: <u>15351</u> a) Order as per Dwg D6006 b) Material: 3.250 x 0.515 wall 7075-T6/T6511 (WW-T-700/7 or QQ-A-225/9 or QQ-A-200/11) seamless aluminum tube c) Minimum ultimate tensile strength = 77 ksi d) Minimum tensile yield strength = 66 ks								
110	Receive & Inspect for Damage & Mat'l Certs	0.00							
110									
Packaging	Memo	0.00							
Packaging	Ensure material certification is attached								
120	QC6- Inspect dimensions to drawing	0.00							
120									
QC	Memo	0.00							
Quality Control	Ensure Material certification comply to Dwg D6006								

CL 1111103 20

43/7/9 (23)

(x23)

DAS
16
9-83 13/7/16

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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NOTE: Date & initial all entries



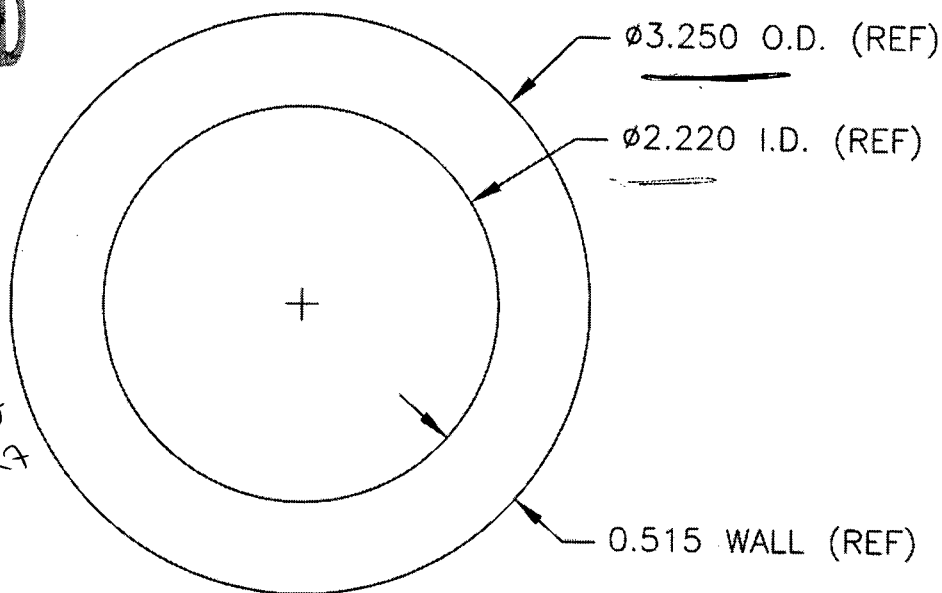
DESIGN <i>CP</i>	DRAWN BY <i>CP</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>A</i>	APPROVED <i>A</i>	DRAWING NO. D6006	REV. A SHEET 1 OF 1
DATE 00.11.17		TITLE CROSSTUBE MATERIAL SCALE 1:1	
A	00.11.17	NEW ISSUE	

SPECIFICATION CONTROL DRAWING

RELEASED
00.11.24 *A*

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UNCONTROLLED COPY
SUBJECT TO AMENDMENT

WITHOUT NOTICE
WORK ORDER
NO. 75644 M.L.J
11/10/27



NOTES

- 1) D6006-XXX CROSSTUBE
LENGTH

WHERE XXX IS LENGTH IN INCHES
EG. 129" LONG TUBE: D6006-129

- 2) MATERIAL: 3.250 OD x 0.515 WALL 7075-T6/T6511 (WW-T-700/7 OR QQ-A-225/9 OR QQ-A-200/11) SEAMLESS ALUMINUM TUBE.
MINIMUM ULTIMATE TENSILE STRENGTH = 77 ksi
MINIMUM YIELD TENSILE STRENGTH = 66 ksi
- 3) TOLERANCES ARE PER ASTM B210 AS FOLLOWS:
O.D.: ± 0.008 MEAN (± 0.016 INCLUDING OVALITY)
WALL: ± 0.020 MEAN (± 0.052 INCLUDING ECCENTRICITY)
LENGTH: XXX $+0.188/-0.000$
STRAIGHTNESS: 0.010" DEVIATION / 12" LENGTH
- 4) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 5) CHEMICAL CONVERSION COAT PER DART QSI 005 4.1

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID **PO15351**

Purchase Order Date 11/03/11

PO Print Date 12/07/11

Page Number 1 of 2

Order From :

VU-ALU001

ALUMINIUMWERK UNNA AG
630 3033 SOUTH PARKER RD
AURORA, CO 80014
USA

Contact Name

Vendor Phone

Vendor Fax

Vendor Account Nbr

303 755 5672

303 755 5936

Buyer

Requisition Nbr

Tax Resale Nbr

Terms

Currency

FOB

Chantal Lavoie

10127-2607

Net 30

USD

Destination-Collect

Ship To :

DART AEROSPACE LTD

1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

REVISED

Line Nbr	Reference Revision ID Vendor Part Number	Description/ Mfg ID	Req Date/ Taxable	Req Qty/ Unit of Measure	Ship Method	Unit Price	Extended Price
1	D6008-132P	Crosstube extrusion	8/29/13 Yes	20.00 Each		\$753.0000	\$15,060.00
Special Inst: AS PER DWG D6008 REV. A B75643 MATERIAL: 7075-T6/T6511 AS PER WW- T-700/7 OR QQ-A-200/11 OR QQ-A-225/9 SEAMLESS TUBE MINIMUM ULTIMATE TENSILE STRENGTH = 77 KSI MINIMUM TENSILE YIELD STRENGTH = 66 KSI SIZE: 3.250" OD X 0.438" WALL X 132" LONG							
2	D6006-129P	Crosstube material	8/29/13 Yes	20.00 Each	✓	\$967.0000	\$19,340.00

Net 23 / 43/1/9

No substitution or deviation without
consent.
Certificate of Conformity or Material
Certification required when applicable

Change Nbr: 2

Change Date: 12/07/11

Abnahmeprüfzeugnis 3.1 - DIN EN 10204:2005

Inspection Certificate 3.1 - DIN EN 10204:2005 / Certificat de Reception 3.1- DIN EN 10204:2005

Kunde: Dart Aerospace Ltd.
Client: 1270 Aberdeen Street
K6A1K7 Hawkesbury, ON Canada

Zeugnisnummer: 913/13
Cert No. / No. du certificat: PO 15351
Bestellnummer: Order No. / No. de commande
Auftrag: 44994/200
Our Reference/Notre Reference:

Produkt: Rohre nahtlos gepresst
Product / Produit: Tubes seamless extruded
Spezifikation: AMS - QQ - A - 200/11; Spezifikation Dart Aerospace D6006
Specification:

Werkstoff: 7075
Alloy/Alliage: **Zustand:** T 6511
Temper/État:

Abmessung 3,250 INCH x 2,220 INCH x 0,515 INCH x 129,000 INCH
Size / Dimension D6006-129 3.250 X 0.515 X 129

Kennzeichnung ALUnna - Cert No. 913/13 - 7075 - T 6511 - Cast No.- AMS QQA 200/11 - 3.250" OD X 0.515" Wall - Heat Lot No. 1401680 -
Marking/Marquage: ALUnna Order Conf. No. 44994/200-1 PO. 15351

Lieferung pcs. lbs
Delivered Material / Matériel délivré: 23 1338
Country of Manufacture: Germany
Products are in accordance with applicable RoHS

1. Chemische Analyse Chemical Analysis / analyse chimique

Charge/ Cast No.	min. max.	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Pb	Zr	Bi	Sn	Ni
		0,40	0,50	1,2 2,0	0,30	2,1 2,9	0,18 0,28	5,1 6,1	0,20					
9398/13		0,103	0,175	1,654	0,059	2,364	0,204	5,873	0,035	0,004	0,0179	0,0001	0,0015	0,0002

Hydrogen content: 0,19 ccm/100 g Al Elements without indication < 0,01 % **country of melt manufacturer: Germany**

8958/13		0,080	0,165	1,587	0,062	2,459	0,211	5,813	0,033	0,002	0,0211	0,0001	0,0015	0,0001
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Hydrogen content: 0,12 ccm/100 g Al Elements without indication < 0,01 % **country of melt manufacturer: Germany**

2. Mechanische Eigenschaften Mechanical Properties / Valeurs Mécaniques

Anforderungen Requirements	tensile (Rm) ksi	yield (Rp0,2) ksi	elongation 2" %	elongation A %	Hardness HB	Heat Lot No.
min. max.	77,0	66,0	7,0		Cast	
1	85,115	77,430	11,0		8958-6 pcs.	1401680
2	84,680	77,575	11,0		9398-17 pcs	1401680
3	83,230	76,125	11,0		9398	1401680

813/17/16

RMS: outside 25 - max. 22,0 µ"

Ergebnis der Prüfungen: Es wird bestätigt, daß die Lieferung geprüft wurde und den Vereinbarungen bei der Bestellannahme entspricht

Test results: We confirm that the delivery has been tested and applies to the agreements made on receipt of the order
Resultats: Nous confirmons que la livraison a été contrôlée et correspond avec les conventions faites à la réception de la commande

gshwindU

02.07.2013



Certified acc. DIN EN ISO 9001:2008 and DIN EN 9100:2003
valid until 2013-11-10
Cert.- Reg. No.: 001959 QM08; 001959 ASH

Aluminiumwerk Unna AG, Uelzener Weg 36, 59425 Unna, Germany



ALUnna

Abnahmebeauftragter

EXTRUSION INSPECTION SHEET

		SIDE A	SIDE B					ULTRA SONIC MEASUREMENTS				
TUBE #	TOTAL LENGTH	DIA two readings	DIA two readings	INSIDE DIA	wall thickness measured w/vern	Strightness at 12" in middle	Rockwell Reading	LOCATION on tube	R1	R2	R3	R4
DWG	129.000"	3.250"		2.220"	0.515"	0.010"	N/A	Middle	N/A			
1	129.000"	3.257"/3.260"	3.254"/3.255"	2.219"	0.511"/0.519"	0.0025"	N/A	Middle	0.527"	0.529"	0.513"	0.507"
2	129.000"	3.258"/3.257"	3.257"/3.255"	2.214"	0.526"/0.506"	0.0025"	N/A	Middle	0.507"	0.521"	0.529"	0.515"
3	129.000"	3.260"/3.258"	3.256"/3.253"	2.214"	0.526"/0.509"	.0020"	N/A	Middle	0.513"	0.523"	0.520"	0.511"
4	129.000"	3.252"/3.250"	3.254"/3.252"	2.217"	0.526"/0.505"	0.0040"	N/A	Middle	0.524"	0.506"	0.502"	0.522"
5	129.000"	3.250"/3.249"	3.251"/3.249"	2.212"	0.514"/0.504"	0.0015"	N/A	Middle	0.526"	0.512"	0.504"	0.516"
6	129.000"	3.259"/3.257"	3.256"/3.254"	2.216"	0.522"/0.511"	0.0030"	N/A	Middle	0.517"	0.504"	0.516"	0.529"
7	129.000"	3.249"/3.253"	3.253"/3.252"	2.209"	0.526"/0.503"	0.0020"	N/A	Middle	0.525"	0.510"	0.510"	0.519"
8	129.000"	3.257"/5.250"	3.254"/3.255"	2.215"	0.525"/0.503"	0.0020"	N/A	Middle	0.517"	0.529"	0.512"	0.503"
9	129.000"	3.246"/3.245"	3.246"/3.243"	2.214"	0.513"/0.502"	0.0030"	N/A	Middle	0.506"	0.527"	0.521"	0.498"
10	129.000"	3.251"/3.249"	3.251"/3.241"	2.208"	0.523"/0.506"	0.0030"	N/A	Middle	0.522"	0.501"	0.511"	0.529"
11	129.000"	3.247"/3.245"	3.247"/3.241"	2.212"	0.519"/0.509"	0.0030"	N/A	Middle	0.499"	0.524"	0.531"	0.509"
12	129.000"						N/A	Middle				
13	129.000"						N/A	Middle				
14	129.000"						N/A	Middle				
15	129.000"						N/A	Middle				
PART # D6006-129		P/O# 15351			BATCH # 75644			Notes: Measurements in Inches				

MEAN OUTSIDE DIAMETER PERMISSIBLE ± 0.006 side A									
Tube #	Actual A	Actual B	Mean	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.257	3.260	3.259	3.250	0.006	3.244	3.256	0.014	0.002
2	3.258	3.257	3.258	3.250	0.006	3.244	3.256	0.014	0.002
3	3.260	3.258	3.259	3.250	0.006	3.244	3.256	0.015	0.003
4	3.252	3.250	3.251	3.250	0.006	3.244	3.256	0.007	-0.005
5	3.250	3.249	3.250	3.250	0.006	3.244	3.256	0.006	-0.006
6	3.259	3.257	3.258	3.250	0.006	3.244	3.256	0.014	0.002
7	3.249	3.253	3.251	3.250	0.006	3.244	3.256	0.007	-0.005
8	3.257	3.250	3.254	3.250	0.006	3.244	3.256	1.010	0.998
9	3.246	3.245	3.246	3.250	0.006	3.244	3.256	0.001	-0.011
10	3.251	3.249	3.250	3.250	0.006	3.244	3.256	0.006	-0.006
11	3.247	3.245	3.246	3.250	0.006	3.244	3.256	0.002	-0.010
12									
13									
14									
15									
16									

MEAN OUTSIDE DIAMETER PERMISSIBLE ± 0.006 Side B									
Tube #	Actual A	Actual B	Mean	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.254	3.255	3.255	3.250	0.006	3.244	3.256	0.011	-0.001
2	3.257	3.255	3.256	3.250	0.006	3.244	3.256	0.012	0.000
3	3.256	3.253	3.255	3.250	0.006	3.244	3.256	0.011	-0.001
4	3.254	3.252	3.253	3.250	0.006	3.244	3.256	0.009	-0.003
5	3.251	3.249	3.250	3.250	0.006	3.244	3.256	0.006	-0.006
6	3.256	3.254	3.255	3.250	0.006	3.244	3.256	0.011	-0.001
7	3.253	3.252	3.253	3.250	0.006	3.244	3.256	0.008	-0.003
8	3.254	3.255	3.255	3.250	0.006	3.244	3.256	0.011	-0.001
9	3.246	3.243	3.245	3.250	0.006	3.244	3.256	0.000	-0.011
10	3.251	3.241	3.246	3.250	0.006	3.244	3.256	0.002	-0.010
11	3.247	3.241	3.244	3.250	0.006	3.244	3.256	0.000	-0.012
12									
13									
14									
15									
16									

OUTSIDE DIA. Permissible (with Ovality) ± 0.012 side A							
Tube #	Actual A	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.257	3.250	0.012	3.238	3.262	0.019	-0.005
2	3.258	3.250	0.012	3.238	3.262	0.020	-0.004
3	3.260	3.250	0.012	3.238	3.262	0.022	-0.002
4	3.252	3.250	0.012	3.238	3.262	0.014	-0.010
5	3.250	3.250	0.012	3.238	3.262	0.012	-0.012
6	3.259	3.250	0.012	3.238	3.262	0.021	-0.003
7	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
8	3.257	3.250	0.012	3.238	3.262	0.019	-0.005
9	3.246	3.250	0.012	3.238	3.262	0.008	-0.016
10	3.251	3.250	0.012	3.238	3.262	0.013	-0.011
11	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
12							
13							
14							
15							
16							

OUTSIDE DIA. Permissible (with Ovality) ± 0.012 side b							
Tube #	Actual A	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.254	3.250	0.012	3.238	3.262	0.016	-0.008
2	3.257	3.250	0.012	3.238	3.262	0.019	-0.005
3	3.256	3.250	0.012	3.238	3.262	0.018	-0.006
4	3.254	3.250	0.012	3.238	3.262	0.016	-0.008
5	3.251	3.250	0.012	3.238	3.262	0.013	-0.011
6	3.256	3.250	0.012	3.238	3.262	0.018	-0.006
7	3.253	3.250	0.012	3.238	3.262	0.015	-0.009
8	3.254	3.250	0.012	3.238	3.262	0.016	-0.008
9	3.246	3.250	0.012	3.238	3.262	0.008	-0.016
10	3.251	3.250	0.012	3.238	3.262	0.013	-0.011
11	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
12							
13							
14							
15							
16							

OUTSIDE DIA. Permissible (with Ovality) ± 0.012 side A							
Tube #	Actual B	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.260	3.250	0.012	3.238	3.262	0.022	-0.002
2	3.257	3.250	0.012	3.238	3.262	0.019	-0.005
3	3.258	3.250	0.012	3.238	3.262	0.020	-0.004
4	3.250	3.250	0.012	3.238	3.262	0.012	-0.012
5	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
6	3.257	3.250	0.012	3.238	3.262	0.019	-0.005
7	3.253	3.250	0.012	3.238	3.262	0.015	-0.009
8	3.250	3.250	0.012	3.238	3.262	0.012	-0.012
9	3.245	3.250	0.012	3.238	3.262	0.007	-0.017
10	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
11	3.245	3.250	0.012	3.238	3.262	0.007	-0.017
12							
13							
14							
15							
16							

OUTSIDE DIA. Permissible (with Ovality) ± 0.012 side b							
Tube #	Actual B	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.255	3.250	0.012	3.238	3.262	0.017	-0.007
2	3.255	3.250	0.012	3.238	3.262	0.017	-0.007
3	3.253	3.250	0.012	3.238	3.262	0.015	-0.009
4	3.252	3.250	0.012	3.238	3.262	0.014	-0.010
5	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
6	3.254	3.250	0.012	3.238	3.262	0.016	-0.008
7	3.252	3.250	0.012	3.238	3.262	0.014	-0.010
8	3.255	3.250	0.012	3.238	3.262	0.017	-0.007
9	3.243	3.250	0.012	3.238	3.262	0.005	-0.019
10	3.241	3.250	0.012	3.238	3.262	0.003	-0.021
11	3.241	3.250	0.012	3.238	3.262	0.003	-0.021
12							
13							
14							
15							
16							

end measurement with vern

Mean OUTSIDE DIA. Permissible +- 0.015									
Tube	Actual A	Actual B	Mean	Nominal	Tolerance	min	max	min	max
1	0.511	0.519	0.515	0.515	0.015	0.500	0.530	0.015	-0.015
2	0.526	0.506	0.516	0.515	0.015	0.500	0.530	0.016	-0.014
3	0.526	0.509	0.518	0.515	0.015	0.500	0.530	0.0175	-0.013
4	0.526	0.505	0.516	0.515	0.015	0.500	0.530	0.0155	-0.015
5	0.514	0.504	0.509	0.515	0.015	0.500	0.530	0.009	-0.021
6	0.522	0.511	0.517	0.515	0.015	0.500	0.530	0.0165	-0.014
7	0.526	0.503	0.515	0.515	0.015	0.500	0.530	0.0145	-0.016
8	0.525	0.503	0.514	0.515	0.015	0.500	0.530	0.014	-0.016
9	0.513	0.502	0.508	0.515	0.015	0.500	0.530	0.0075	-0.023
10	0.523	0.506	0.515	0.515	0.015	0.500	0.530	0.0145	-0.016
11	0.519	0.509	0.514	0.515	0.015	0.500	0.530	0.014	-0.016
12				0.515	0.015	0.500	0.530	#VALUE!	#VALUE!
13				0.515	0.015	0.500	0.530	#VALUE!	#VALUE!
14				0.515	0.015	0.500	0.530	#VALUE!	#VALUE!
15				0.515	0.015	0.500	0.530	#VALUE!	#VALUE!

OUTSIDE DIA. Permissible +- 0.038								
Tube	Actual A	Actual B	Nominal	Tolerance	min	max	min	max
1	0.511	0.519	0.515	0.038	0.477	0.553	0.034	-0.034
2	0.526	0.506	0.515	0.038	0.477	0.553	0.049	-0.047
3	0.526	0.509	0.515	0.038	0.477	0.553	0.049	-0.044
4	0.526	0.505	0.515	0.038	0.477	0.553	0.049	-0.048
5	0.514	0.504	0.515	0.038	0.477	0.553	0.037	-0.049
6	0.522	0.511	0.515	0.038	0.477	0.553	0.045	-0.042
7	0.526	0.503	0.515	0.038	0.477	0.553	0.049	-0.050
8	0.525	0.503	0.515	0.038	0.477	0.553	0.048	-0.050
9	0.513	0.502	0.515	0.038	0.477	0.553	0.036	-0.051
10	0.523	0.506	0.515	0.038	0.477	0.553	0.046	-0.047
11	0.519	0.509	0.515	0.038	0.477	0.553	0.042	-0.044
12			0.515	0.038	0.477	0.553	-0.477	-0.553
13			0.515	0.038	0.477	0.553	-0.477	-0.553
14			0.515	0.038	0.477	0.553	-0.477	-0.553
15			0.515	0.038	0.477	0.553	-0.477	-0.553

center measurment with ultra sonic

Mean OUTSIDE DIA. Permissible +/- 0.015									
Tube	highest	lowest	Mean	Nominal	Tolerance	min	max	min	max
1	0.529	0.507	0.518	0.515	0.015	0.500	0.530	0.018	-0.012
2	0.529	0.507	0.518	0.515	0.015	0.500	0.530	0.018	-0.012
3	0.520	0.511	0.516	0.515	0.015	0.500	0.530	0.0155	-0.015
4	0.524	0.502	0.513	0.515	0.015	0.500	0.530	0.013	-0.017
5	0.526	0.504	0.515	0.515	0.015	0.500	0.530	0.015	-0.015
6	0.529	0.504	0.517	0.515	0.015	0.500	0.530	0.0165	-0.014
7	0.525	0.510	0.518	0.515	0.015	0.500	0.530	0.0175	-0.013
8	0.529	0.503	0.516	0.515	0.015	0.500	0.530	0.016	-0.014
9	0.527	0.498	0.513	0.515	0.015	0.500	0.530	0.0125	-0.018
10	0.529	0.501	0.515	0.515	0.015	0.500	0.530	0.015	-0.015
11	0.531	0.499	0.515	0.515	0.015	0.500	0.530	0.015	-0.015
12			#DIV/0!	0.515	0.015	0.500	0.530	#DIV/0!	#DIV/0!
13			#DIV/0!	0.515	0.015	0.500	0.530	#DIV/0!	#DIV/0!
14			#DIV/0!	0.515	0.015	0.500	0.530	#DIV/0!	#DIV/0!
15			#DIV/0!	0.515	0.015	0.500	0.530	#DIV/0!	#DIV/0!

OUTSIDE DIA. Permissible +/- 0.038								
Tube	highest	lowest	Nominal	Tolerance	min	max	min	max
1	0.529	0.507	0.515	0.038	0.477	0.553	0.052	-0.046
2	0.529	0.507	0.515	0.038	0.477	0.553	0.052	-0.046
3	0.520	0.511	0.515	0.038	0.477	0.553	0.043	-0.042
4	0.524	0.502	0.515	0.038	0.477	0.553	0.047	-0.051
5	0.526	0.504	0.515	0.038	0.477	0.553	0.049	-0.049
6	0.529	0.504	0.515	0.038	0.477	0.553	0.052	-0.049
7	0.525	0.510	0.515	0.038	0.477	0.553	0.048	-0.043
8	0.529	0.503	0.515	0.038	0.477	0.553	0.052	-0.050
9	0.527	0.498	0.515	0.038	0.477	0.553	0.050	-0.055
10	0.529	0.501	0.515	0.038	0.477	0.553	0.052	-0.052
11	0.531	0.499	0.515	0.038	0.477	0.553	0.054	-0.054
12			0.515	0.038	0.477	0.553	-0.477	-0.553
13			0.515	0.038	0.477	0.553	-0.477	-0.553
14			0.515	0.038	0.477	0.553	-0.477	-0.553
15			0.515	0.038	0.477	0.553	-0.477	-0.553